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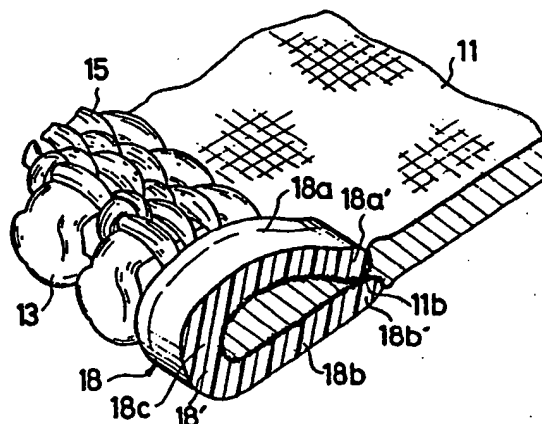
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(54) **Slide fastener with thermoplastic end stops.**

(57) A slide fastener 10 includes an end stop (18) which is made of a thermoplastic material and allowed on melting by ultrasonic or high-frequency fusion to permeate yarns (11a) of fastener tapes (11), penetrate the interstices or openings (11b) in the tapes and fuse together at the confronting ends (18a', 18b') of the end stop with the tape (11) sandwiched therebetween thereby firmly anchoring the same in place against movement even under increased stresses.

FIG. 1



- 1 -

SLIDE FASTENER WITH THERMOPLASTIC END STOPS

This invention relates generally to slide fasteners and more particularly to end stop devices therefor. The slide fastener is provided with a slider receiprocally movable for opening and closing the same, 5 the reciprocal movement of the slider being limited by stop members mounted on the top and bottom ends of the fastener.

There has been proposed a variety of fastener end stops, some being made of metals and others of 10 plastics. Those made of thermoplastic materials to which the invention appertains are typically disclosed for example in Japanese patent Publication Nos. 48-37421 and 49-36975, in which a piece of thermo- plastic film or monofilament is attached by welding 15 thermally or ultrasonically to an inner edge of a slide fastener tape, so that the film, fastener elements and tape yarns are integrally joined together. Such conventional end stops are however not entirely satisfactory in that their bondage to the fastener is

reduced particularly where the fastener tapes are formed by different, relatively long filament yarns which present a slippery tape surface. Other difficulties of the prior art devices are found in that
5 when end stops are attached to woven or knitted tapes having surface irregularities, the thermoplastic resin of the end stops tends to produce objectionable burrs or fins which would not only mar the product value but also present a fear for physical injury to the user,
10 and in that when end stops are applied only to one side of the tape, their anchorage thereto is insufficient to withstand impinging forces exerted by the slider.

According to the present invention, there is provided a slide fastener comprising: a pair of slide
15 fastener stringers each having a stringer tape and a row of coupling elements mounted on and along an inner longitudinal edge of each stringer tape, said stringer tape having a porous structure; a slider slidably mounted on the two rows of coupling elements to take
20 them into and out of interdigitating engagement with each other to close and open the slide fastener; and an end stop of thermoplastic synthetic resin attached to at least one of said fastener stringer tapes adjacent to an end of said row of coupling elements to prevent
25 said slider from leaving the coupling elements, said end stop including upper and lower wings disposed one on opposite faces of said one stringer tape, said wings

having respective one end portions fused to each other and extending through pores in said stringer tape.

The present invention seeks to provide improved end stops for slide fasteners which will eliminate or alleviate the foregoing difficulties of the prior art devices. More specifically, the invention is aimed at the provision of fastener end stops made of a thermoplastic material which are applied to both sides of fastener tapes by means of ultrasonic, high-
10 frequency or heat processing in such a manner that opposite end portions of each end stop are fused together through interstices or openings in a fabric tape of either woven or knitted structure.

The above and other objects and features of the invention will be better understood from the following description taken in conjunction with the accompanying drawings which illustrate by way of example some preferred embodiments of the invention and in which like reference numerals refer to like and corresponding
15 parts through the several views.

Figure 1 is a fragmentary perspective view on enlarged scale of a slide fastener stringer to which a top end stop embodying the invention is applied at its top end;

25 Figure 2 is a plan view partly cut away of the slide fastener stringer of Figure 1;

Figure 3 is a plan view of a slide fastener

having end stops of the invention applied at both its top and bottom ends;

Figure 4 is a perspective view of a starting form of a top end stop according to the invention;

5 Figure 5 is a perspective view of another form of a top end stop according to the invention;

Figure 6 is a transverse cross-sectional view of a slide fastener carrying a modified form of top end stops according to the invention;

10 Figure 7 is a fragmentary plan view of a modified slide fastener tape to which the top end stop of the invention is applied;

Figure 8 is a view similar to Figure 7 but showing another form of tape to which the inventive top end stop is applied;

15 Figure 9 is a transverse cross-sectional view of a knit fastener tape to which the inventive top end stop is applied;

Figure 10 and 11 are fragmentary plan views showing the top end stops applied at different positions on the fastener stringers;

Figure 12 is a transverse cross-sectional view taken on the line XII - XII of Figure 11;

Figure 13 is a perspective view on enlarged scale of a starting form of a bottom end stop embodying the invention; and

Figure 14 and 15 are transverse cross-sectional

views of fastener stringers to which the inventive bottom stops are applied in different fashions.

Referring now to the drawings and firstly to Figure 3, there is shown a slide fastener 10 which comprises a pair of identical stringer tapes 11, 11 each carrying a continuous row of coupling elements 13 along its inner longitudinal edge 14, the coupling elements 13 being secured to the tape edges as by sewing threads 15 as better shown in Figures 1 and 2.

10 A slider 16 has a pull tab 17 with which the slider is normally moved along the rows of coupling elements 13 in one direction to open and the other direction to close the slide fastener 10 in a manner well known in the art. The reciprocal movement of the slider 16 in a

15 direction to close the fastener 10 is limited or stopped at the top end of the fastener 10 by a pair of top end stops 18, 18 as the slider flanges 16a (shown in Figure 2) are brought into abutting engagement with the respective end stops 18. Movement of the slider 16

20 in a direction to open the fastener 10 is limited or stopped at the bottom end of the fastener 10 as it comes into contact with a bottom end stop 20.

Figure 4 shows a starting form of the top end stop 18 made of a thermoplastic resin such as

25 polyester, polyamide or the like which initially assumes an elongated monofilamentary strip 19 of predetermined width and thickness. This elongated

strip is cut to a predetermined length as along the dotted-line and centrally folded on itself to provide a substantially U-shaped staple-like end stop blank 18' having an upper leg 18a and a lower leg 18b interconnected by a rounded corner 18c.

Another starting form of top end stop 18 is shown in Figure 5 as designated at 19', which is a profile cut to provide a U-shaped end stop blank 18' identical to that of Figure 4.

10 The U-shaped blank 18', as shown in Figures 1 and 2, is mounted astride the edge 14 of a woven tape 11 in close proximity to a terminal one of the coupling elements 13, and anchored in place by ultrasonic or high-frequency fusion of the material of the blank 18' while the latter is molded into a final shape free of burrs or fins, in which instance the upper leg 18a is deformed with its end portion 18a' pressed against confronting end portion 18b' of the lower leg 18b which lies straight against and in parallel with the plane of the tape 11. The blank 18' envelopes therein the sewing threads 15 together with the tape edge 14 when it is mounted on the latter. This deforming action causes individual yarns 11a of the tape 11 to spread apart to provide openings 11b of windened interstices or pores through which the molten resin material of the blank 18' penetrates and adhesively join the confronting ends 18a', 18b' of the respective legs 18a,

18b to provide the top end stop 18. Ultrasonic processing as applied in Figures 1 and 2 creates a hammering action which is transmitted through the blank 18' to the woven tape 11, to cause woven yarns 11a to spread apart thereby to provide desired openings 11b.

5 Figure 6 shows a modified embodiment of the invention in which the upper leg 18a is deformed to provide a swollen portion 18d contiguous to the fused ends 18a', 18b' which thus serves effectively as an abutment for engagement with the slider flange 16a (Figure 2). A plurality of projections 18e may be formed integrally on the confronting surfaces of the ends 18a', 18b' of the upper and lower legs 18a, 18b so as to facilitate the intrusion of the resin material of the blank 18' into the openings 11b.

15 Figure 7 shows a fastener stringer tape 11 having bores 11c which are preformed as by punching and which should be peripherally fused to avoid frays, the bores 11c being utilized for the passage of molten resin of the blank 18'.

20 The openings 11b for the same purpose may be formed by providing the weave of the tape 11 with a coarse interstice portion 11d as shown in Figure 8 or by inserting heated pin tools into the interstices to spread permanently the same.

Figure 9 shows a top end stop 18 mounted on a knitted tape 11 having alternate wales 21a and grooves

21b in which instance the ends 18a' and 18b' of the end stop blank 18' are confronted across the groove 21b which has coarse interstices serving as openings 11b for the penetration of the molten resin of the staple
5 18'.

Figure 10 shows the top end stop 18 mounted in between adjacent coupling elements 13, while the end stop 18 may alternatively be mounted directly over the coupling elements 13 and fused in place together
10 therewith as shown in Figures 11 and 12.

There is shown in Figure 13 a bottom end stop blank 20' of a generally H-shape made of a thermoplastic material similar to the blank 18' which is cut along the dotted line into starting blocks 22 for
15 bottom end stops 20 each having an upper wing 22a and a lower wing 22b interconnected centrally by a connecting neck 22c. This end stop blank 20' is mounted at the bottom end of each of the tapes 11 and 12 with the tape edges 14 inserted between and gripped by the upper and
20 lower wings 22a and 22b and anchored in place, as shown in Figure 14, by fusing respective ends 22a', 22b'; 22a', 22b' of the blank 20' of the thermoplastic material in a similar processing to that applied for the formation of the top end stops 18.

25 Figure 15 shows a modified form of bottom end stop 30 which is similar to the bottom end stop 20 of Figure 14 except that the modified end stop 30 is

devoid of the neck 22c; that is, the starting form
being two separate wings 22a and 22b that are
juxtaposed over the confronting tape edges 14 and
applied to the tape in a manner similar to the bottom
5 end stop 20.

According to the invention, the top end stops
18, 19 and the bottom end stops 20 alike can be
securely anchored in place on the fastener tapes 11, 12
against displacement on impinging contact with the
10 slider 16, this being accomplished by the adhesive
system in which the thermoplastic resinous material
constituting the end stops is allowed on melting to
permeate the yarns of the tapes, penetrate through
their interstices or openings 11b and fuse together at
15 the confronting ends of the end stops.

20

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CLAIMS:

1. A slide fastener (10) comprising: a pair of slide fastener stringers each having a stringer tape (11) and a row of coupling elements (13) mounted on and
5 along an inner longitudinal edge (14) of each stringer tape, said stringer tape (11) having a porous structure; a slider (16) slidably mounted on the two rows of coupling elements (13) to take them into and out of interdigitating engagement with each other to
10 close and open the slide fastener (10); and an end stop (18; 20; 30) of thermoplastic synthetic resin attached to at least one of said fastener stringer tapes (11) adjacent to an end of said row of coupling elements (13) to prevent said slider (16) from leaving the
15 coupling elements, said end stop including upper and lower wings (18a, 18b; 22a, 22b) disposed one on opposite faces of said one stringer tape (11), said wings having respective one end portions (18a', 18b'; 22a', 22b') fused to each other and extending through
20 pores (11b) in said stringer tape.

2. A slide fastener according to claim 1, wherein said end stop is a top end stop (18), said upper and lower wings (18a, 18b) being integrally joined together at the other ends thereof thereby
25 forming a rounded corner (18c).

3. A slide fastener according to claim 1 or 2, wherein said stringer tape (11) is a woven tape, and

said one end portions (18a', 18b') of said wings (18a , 18b) are fused together through openings (11b) formed by enlarging interstices of the tape (11).

4. A slide fastener according to claim 1 or 2,
5 wherein said one end portions (18a', 18b') of said wings are fused together through bores (11c) formed as by punching said tape (11).

5. A slide fastener according to claim 1 or 2,
wherein said stringer tapes (11) include coarse
10 interstice portions (11d) extending along the respective inner longitudinal edges (14), and said end portions (18a', 18b') of said wings (18a', 18b') are disposed on said coarse interstice portions (11d).

6. A slide fastener according to claim 1 or 2,
15 wherein said stringer tape (11) is a knit tape, and said one end portions of said wings are fused together through openings of said knit tape at grooves (21b) disposed between adjacent pairs of wales (21a) of the same.

20 7. A slide fastener according to one of the claims 1 to 6, wherein said upper wing (18a) is deformed to provide a swollen portion (18d), while said lower wing (18b) lies straight against said tape.

8. A slide fastener according to one of the claims 1 to 7,
25 wherein said end stop (18) is anchored in place between adjacent ones of said coupling elements (13).

9. A slide fastener according to one of the claims 1 to 7,

wherein said end stop (18) is anchored in place over at least one of said coupling elements.

10. A slide fastener according to claim 1,
wherein said end stop is a bottom end stop (20; 30),
5 said upper and lower wings (22a, 22b) bridging the two
stringer tapes (11, 11) at opposite faces of the
latter, said upper and lower wings (22a, 22b) having
respective opposite end portions (22a', 22a'; 22b',
22b') fused correspondingly to each other through
10 openings (11b') in said stringer tapes (11).

11. A slide fastener according to claim 10,
wherein said upper and lower wings (22a, 22b) are
joined integrally at their intermediate portions such
that said end stop (20) has a generally horizontal
15 H-shaped cross section.

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FIG. 1

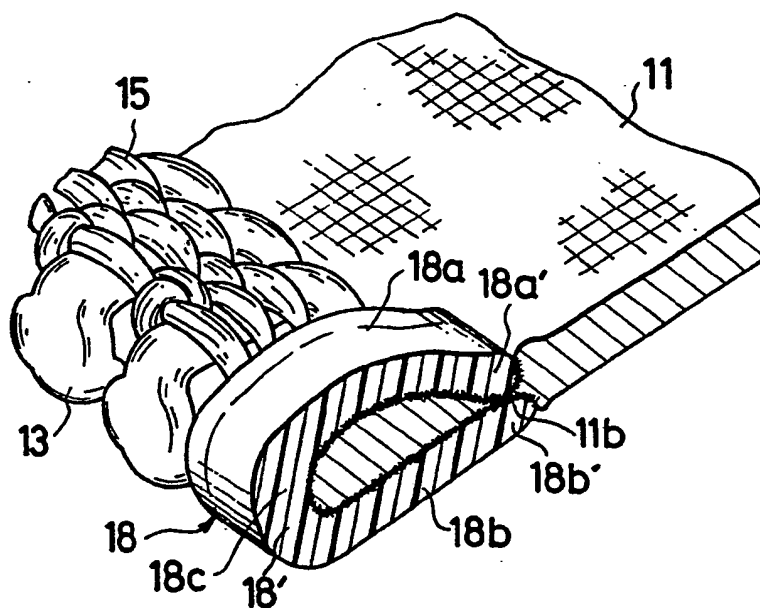


FIG. 2

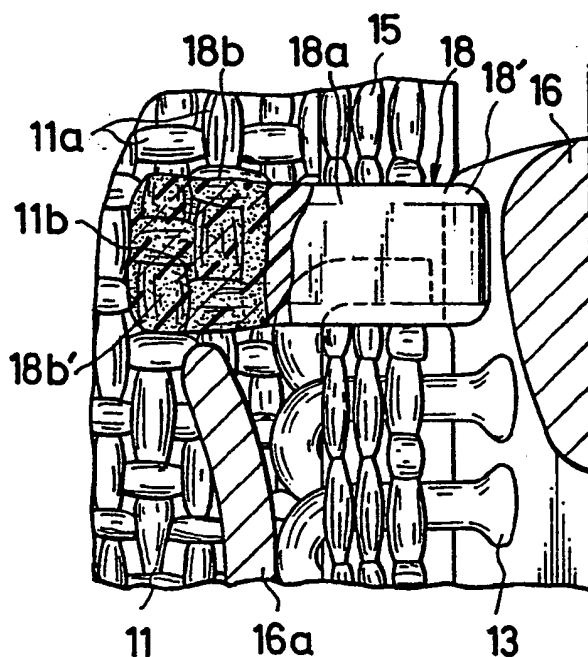


FIG. 3

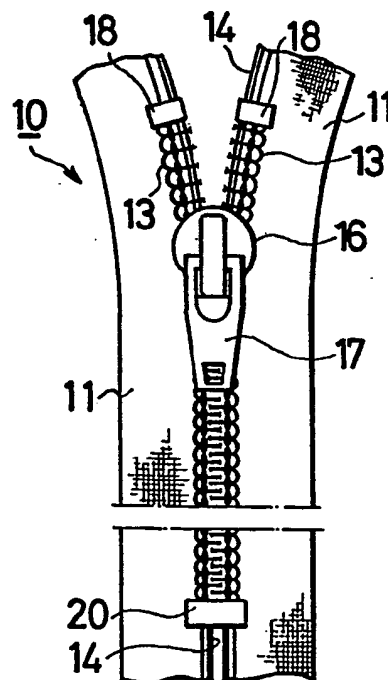


FIG. 4

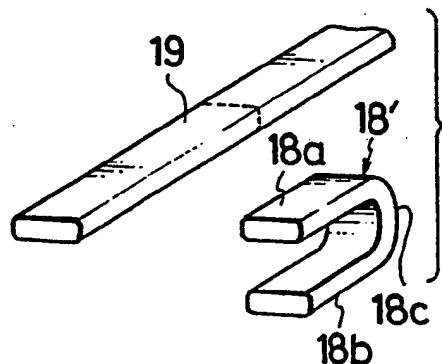


FIG. 5

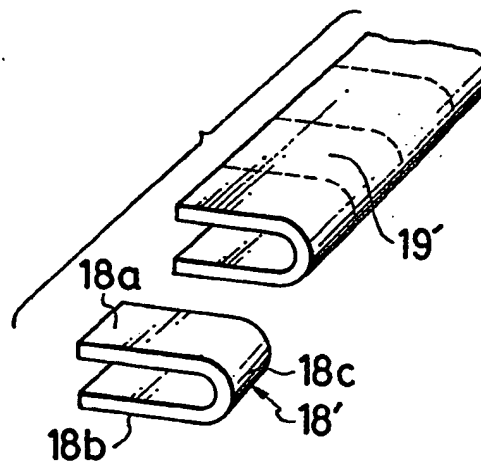


FIG. 6

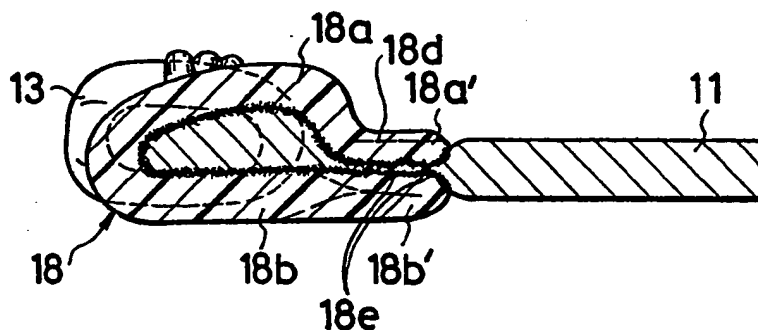


FIG. 7

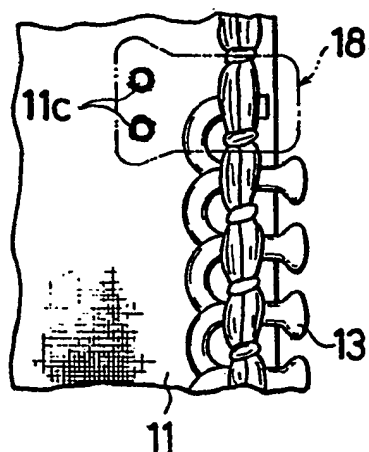


FIG. 8

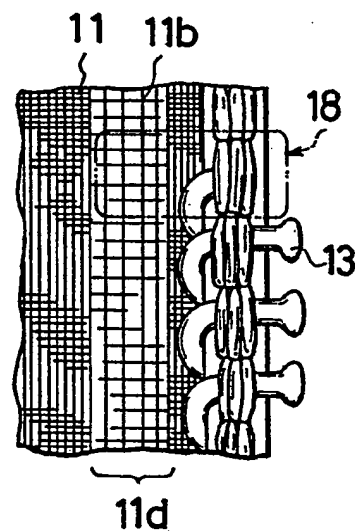


FIG. 9

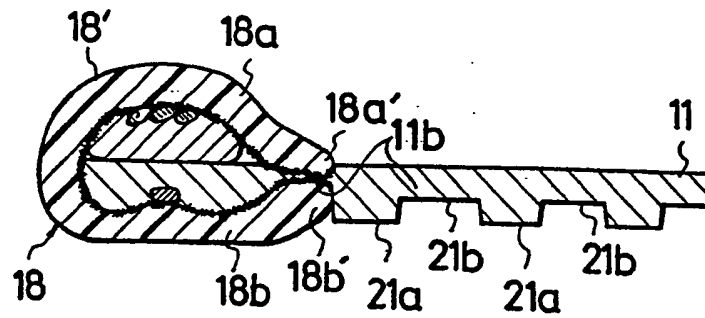


FIG. 10

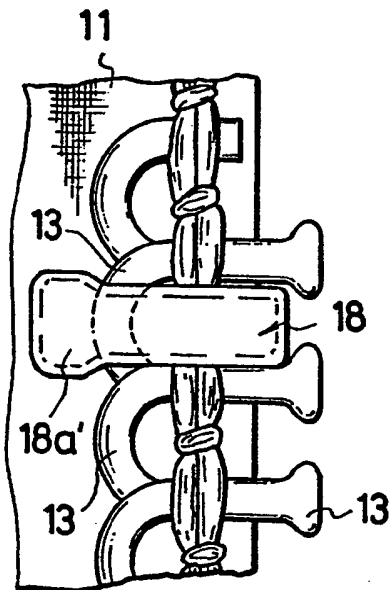


FIG. 11

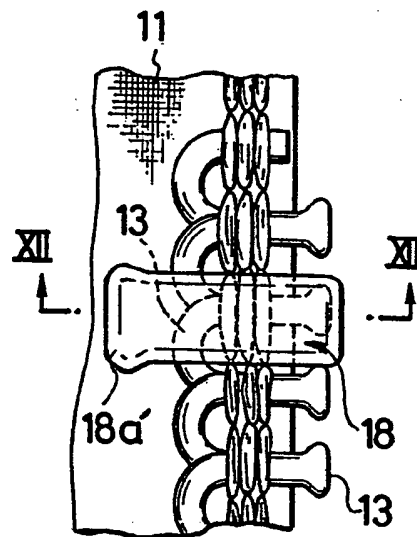


FIG. 12

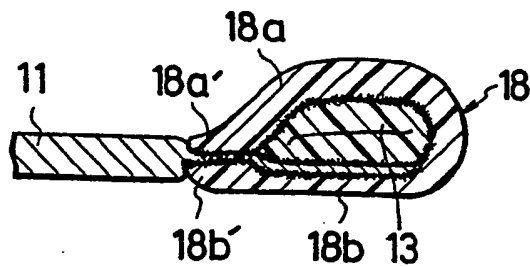


FIG. 13

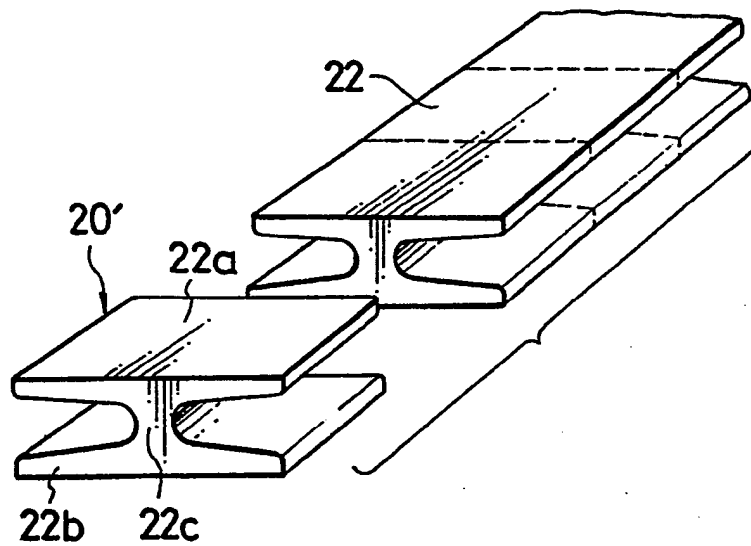


FIG. 14

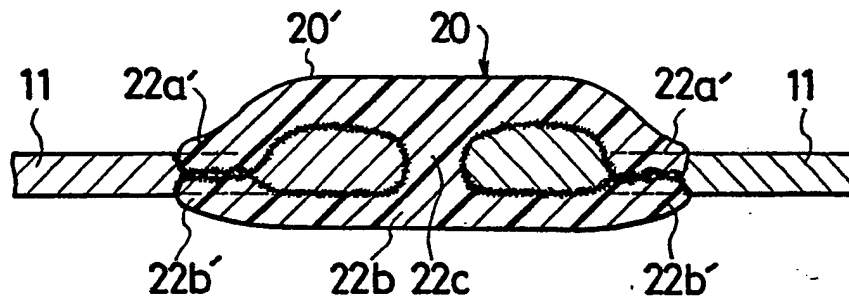
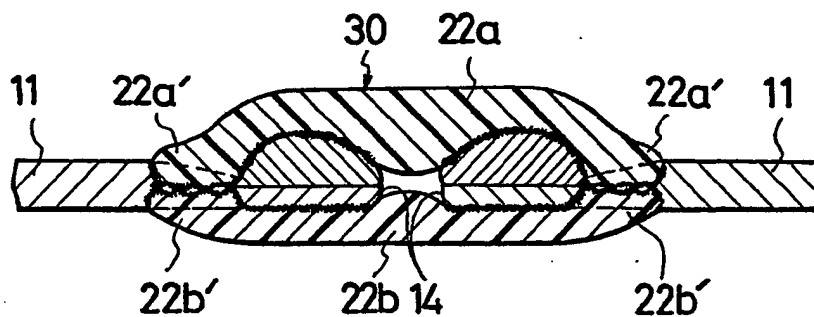


FIG. 15





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	DE-A-2 309 624 (SCHAAF) * Page 1, paragraph 1; page 5, last paragraph - page 7, paragraph 4; page 8, paragraph 2; claims 1-4,8,12; figures 1-4,8,9 *	1-3,5,7	A 44 B, 19/36
A	---	4,6,8,11	
A	US-A-3 813 459 (POTIN) * Column 2, lines 2-19; claims 1,4; figures *	1,9	
A	US-A-2 474 908 (MORIN) * Column 4, lines 6-11; claims; figures *	10,11	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
A	GB-A- 898 772 (LIGHTNING FASTENERS) * Claim 1; figures *	8	A 44 B
A	US-A-3 908 241 (MOERTEL)		
A	GB-A-2 081 805 (TEXTRON)		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22-06-1987	Examiner BOURSEAU A.M.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			



DOCUMENTS CONSIDERED TO BE RELEVANT			Page 2
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	US-A-4 078 278 (MACFEE)		

A	FR-A-2 082 871 (SOCIETE FINANCIERE FRANCAISE DE LICENCES ET BREVETS)		

A	GB-A-1 479 440 (YOSHIDA)		

			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22-06-1987	Examiner BOURSEAU A.M.
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P : intermediate document		& : member of the same patent family, corresponding document	

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